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Cognitive Apprenticeship as a Determinant of Productive Learning among Out-Of-School Emerging Adults Engaged in Mechanic Work in Buea Municipality

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ABSTRACT

The study is titled cognitive apprenticeship as a determinant of productive learning among out-of-school emerging adults engaged in mechanic work in Buea Municipality. Indicators of the study include, coaching, scaffolding, and executive functioning. The specific objectives are; To determine the extent to which coaching impact productive learning among out-of-school emerging adults engaged in mechanic work in Buea Municipality; To find out the extent to which scaffolding impact productive learning among out-of-school emerging adults engaged in mechanic work in Buea Municipality; To ascertain the extent to which executive functioning impact productive learning among out-of-school emerging adults engaged in mechanic work in Buea municipality. Methodologically, the study design used was quasi-experimental research design. The population of the study was made up of 12 apprentices between the ages 18 to 25 in mechanic garages, and 4 trainers. The study took place in Buea in Cameroon in two mechanic garages. The instruments used for data collection were questionnaire, observational checklist and interview guide. The procedure for data collection was through observing and training the expert on psycho-pedagogy skills who later trained the apprentice and they were later tested. Pretest and posttest was tested. The study was carried out in two mechanic workshops. Each of the garages had experimental and control groups. The sampling technique was purposive sampling technique. Quantitative data was entered using EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) and analyzed using the Statistical Package for Social Sciences (SPSS) Standard version, Release 21.0 (IBM Inc. 2012). Data collected from the field were subjected to both descriptive and inferential statistics. For the descriptive data, frequency distribution tables and charts were used to present and describe the data obtained. Cohen's *d* was used to compare assert significant difference of the inferential statistics. The finding was as follow; coaching experimental group ha total mean 8.7 at pretest and it rose to 11.9 at posttest and productive learning had a mean of 9.7 at pretest and it rose to 13.4. It was recommended that coaching, scaffolding and should constantly be applied in mechanic garages by the trainers so that apprentice can gain knowledge, aptitudes, skills, competencies and become productive.

KEYWORDS: *Cognitive apprenticeship, coaching, out-of-school emerging adults, productive learning*

INTRODUCTION

Apprenticeship is a kind of on-the-job training under the supervision of a craft person or trade professional in which novices learn the practical and theoretical aspect of a skill occupation. On the other hand, traditional apprenticeship differs from cognitive apprenticeship which describes the system of occupational skills and training transmission from expert to novice. This study focus on Cognitive apprenticeship which focuses on the development of cognitive skills such as (critical thinking skills, logical reasoning, analytical skills, listening skills, and problem solving skills) for complex professional practices (Collins, Brown & Newman, 1989). Cognitive apprenticeship differs from traditional apprenticeship learning in that, it focuses on the development of cognitive and metacognitive knowledge rather than the development of physical skills (Collins et al. 1989). The major distinction between cognitive and traditional apprenticeship is that, in traditional apprenticeship, the process of carrying out a task to be learned is usually easily observable (Collins et., 1991). This study therefore focuses on cognitive apprenticeship among emerging adults in the informal sector especially tailoring and mechanic work. Emerging adulthood describe a brief period of transition in to adult roles but a distinct period of the lifecourse, characterized by change and exploration of possible life directions.

Notwithstanding, apprenticeship leads to productive learning. Productive learning is learning on the basis of productive activity in social "serious situations". Learning on the basis of experience of being able to achieve something

important both oneself and one's environment. (UNESCO, 2005) sees productive learning as learning through human development. Productive learning begins with activity, that is learning is itself a product gained by experience of productivity for instance, trade apprenticeship such as tailoring and mechanic craftsmanship. Productive learning therefore entails involving in activity in a real life situation.

Background to the study

Cognitive apprenticeship therefore is an instructional approach that helps teach complex skills and reasoning, through authentic task. In designing a cognitive apprenticeship environment, the expert might ask; what are the central skills and concepts of the subject area one will want to master and how can one make thinking visible. In cognitive apprenticeship, one needs to deliberately bring the thinking to the surface, to make it visible, whether, it is in problem solving. The expert's thinking must be made visible to the novice and the novice thinking must be made visible to the expert. By bring these tacit processes in to the open, learners can observe, enact and practice them with help from the expert (Lave, 1988). In apprenticeship, the skills to be learned are in the task itself. To craft a garment, the apprentice learns some unique skills to tailoring, for example, stitching, and button holes.). Cognitive apprenticeship focuses on the development of learners and skills beyond the apprehension of subject matter content (For example, troubleshooting procedures and applications of diagnostic skills used in workplace). In cognitive apprenticeship, the challenge is to present a range of task varying from systematic and diverse to encourage learners to reflect on and articulate the elements that are common across task. The goal of cognitive apprenticeship is to help learners generalize the skills, to learn when the skill is or not applicable, and to transfer the skill independently when faced with novel situation (Lave, 1988).

Collins et al. (1989) proposed six major characteristics, components or teaching strategies for the concept cognitive apprenticeship. in the development of strategic thinking to learn and apply complex concepts in the environment The strategies are modelling, coaching, scaffolding, reflection, articulation and exploration. This study focus on one of the component of cognitive apprenticeship known as coaching. Firstly, modeling in cognitive apprenticeship means showing how a process unfolds and giving reasons why it happens that way.

Likewise, the goal of this stage is to build mental models of expert's cognitive processes so that learners can eventually work on their own. (Brill, Kim & Galloway, 2001). Mental models are psychological representations of real, hypothetical or imaginary situations and consists of an explanation of someone's thought process about how something works in the real world and also an internal symbol or representation of external reality, hypothesized to play a major role in cognition, reasoning, decision making and problem solving (Sanders, 1896) By seeing both processes modeling and accompanying explanations, learners can develop the knowledge about when and where they should use the knowledge to solve a variety of problems (Seitz, 1999). Therefore, modelling does not just occur at the beginning of the study. As learners experiment and create, the expert might take a moment to model a more sophisticated technique (Darling-Hammond, Austin, Cheug, Lit & Martin, (2006).

Similarly, modelling proposed by Bandura (1977) is an instructional strategy in which an expert demonstrate a new concept or approach to learning and by which the apprentice learn by observing. Modelling requires that an expert demonstrate to novice how to closely approximate the real world setting. Experts can use a variety of method to model complex problem solving including talking aloud protocol requires experts to explain how they approach on certain characteristics of the problem. What is important is the cognitive process or strategy for problem solving is made visible.

The second component of cognitive is coaching; Coaching with cognitive apprenticeship consists of assistance delivered either prior to during or after portion of a learning performance (Darling-Hammond et al., 2006; Gibbons, 1996). The master coaches the apprentice through a wide range of activities, choosing tasks, providing hints, evaluating the activities of apprentices and diagnosing the kinds of problems they are having, challenging them and offering encouragement, giving feedback, structuring the ways to do things, working on particular weaknesses. Therefore, coaching is the process of overseeing the apprentice learning (Collins et al, 1991). One key to effective coaching is to not interfere too much thereby, allowing novices to detect and use their own error (Seitz, 1999; Wilson & Cole, 1991). Coaching involve an expert providing some type of assistance to a learner to facilitate attainment of a goal. However, coaching may be seen as a broader term than scaffolding to assist learners in their learning from start to finish (Brill, Kim & Galloway. 2001).

In the same way, coaching, which Collin, Brown & Newman (1989) define as assistance from masters. ParslocK & Wray (2000) point out that a coach is one who focuses on assisting learners to meet a specific goal while a coach is one who also provides the ongoing support. Coaching consists of providing apprentice with opportunities to attempt problems relevant to everyday life, observing them in practice and providing feedback on their performance in a timely manner and while they actively think about the problem solving strategies. Also, scaffolding as instructional strategy was further discussed by Vygotsky (1978). Scaffolding is a tip and technique that help learners remember how to approach a problem or situation in a given discipline. Scaffolding can take the form of verbal suggestions or physical aids such as cues cards.

Correspondingly, Scaffolding is the third component of cognitive apprenticeship; scaffolding is used when learners have not fully mastered the problem solving process in a discipline and expert provides support for the learners by cooperating with learner in solving a problem. For scaffolding to be effective, the experts must perform an accurate assessment of the apprentice current skill level of difficulty with the task at hand. Likewise fading consists of gradually attempt to solve complex problems or address complex situations. As the expert fades from the problem, situation, the apprentice is responsible for more and more accomplishment of the task. Scaffolding is used in cognitive apprenticeship to empower novices to perform independently (Ding, 2005). The use of guides and

narratives are gradually removed as novices demonstrate the effective problem solving strategies they have incorporated through modelling and coaching. In the place of definite guides, subtle reminders, and hints to support the performance of new skills is given to the apprentice. The novice is asked to assume much of the task as possible but with the knowledge that cooperative problem solving remains available (Collins, Brown & Newman, 1989).

Equally, scaffolding is based on Vygotsky's concept of the zone of proximal development (ZPD); which he defined as the distance between the "actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or collaboration with more capable peers (Wilson et al, 1993). Scaffolding can include tasks that allow learners to see what they are working toward a series of sequenced steps with product, or a variety of aids for learners including materials, techniques and tutoring on specific concepts or skills (Darling-Hammond et al, 2006; Gibbons, 1996). As novices become more skilled, scaffolding is removed (sometimes referred to as fading), giving the apprentice more and more responsibility (Darling-Hammond et al, 2006, Brill, Kim, & Gallowway 2001; Oliver, 1999).

Also, the fourth component of cognitive apprenticeship is reflection; Reflection requires learners to think deeply. Reflection is a cognitive process which when executed, enables the ideas, understandings and experiences of apprentice to be reviewed (Presbkill & Torres, 1999). Reflection allows use of memory, understanding, imagination, and feelings to grasp the essential meaning and value of how one is proceeding. According to Mezirow (1990) reflection allows individuals to correct distortions in their beliefs and critique the presupposition on which their beliefs have built. Therefore, when reflection is applied in the learning environment, expert better understand the mental models of their apprentice (Mezirow, 1990). Walkins & Marsick (1999) maintained that, reflection is learning through which apprentice are enabled to correct flaws in thinking. With reflection, mentor can pose experimentally-based questions or ask apprentices to construct their own questions, throughout the learning experience, questions that consider content (Brill, Kim & Galloway, 2001).

In like manner, articulation is the fifth component of cognitive apprenticeship; Articulation refers to any method that requires learners to share their thinking in terms of how they approach a situation and what they take in to consideration. Articulation can take the form of assignment or inquiry, where experts ask apprentice questions aimed at making visible the learners metacognitive knowledge (Lave & Wenger, 1991). Lastly, exploration involves asking apprentice to imagine other ways in which they might enhance their approach to solving tasks on problem situation. Enkenberg (2001) sees exploration as a cognitive activity where apprentice generate hypotheses which are tested in order to construct new ideas and viewpoints. In addition, articulation consists of expressing things at a verbal level and plays a role in forming patterns of performance and knowledge. It is a part of learning to learn, and must be practiced as part of starting from the beginning of learning (Gibbons, 1996). Talking about one's plans and activities as they solve problem can help learners develop more appropriate mental models of expert's performance (Wilson, et al. 1993) Articulation is therefore interwoven with learning experience through a variety of strategies including, discussion, demonstration, presentation, learner-produced artifacts (Brill, Kim & Gallway, 2001).

Lastly, the sixth component of cognitive is exploration; Exploration occurs once learners is competent enough to solve problems and through reflection, becomes aware of how they think through the problem solving process. Likewise, exploration encourages apprentice to take problem solving to the next step, to begin to ask meaningful questions beyond those that have been addressed. Exploration in cognitive apprenticeship is pushing apprentice to try out their hypotheses, methods and strategies with processes similar to those that experts use to solve problems (Collins, 1991). Exploration consists of forcing the apprentice in to problem solving situations where the path to solution is not clearly labelled and where guidance is sparse (Gibbons, 1996). The apprentice need to continue to articulate and reflect on what they have found as experts do in real situation (Brill, et. al 2001).

Contextually, in the context of Cameroon, is mostly the case of apprenticeship. Apprenticeship combines enterprise-based training in productive skills with financing scheme to meet the financial constraint of young people, their families, and their community. At the core of apprenticeship in Cameroon, there is an agreement made between the expert and the apprentice, where by training is integrated in to the production and work process which enhances cost-effectiveness of apprenticeship skill development, which contributes to productivity and employeability of the novice. The apprentice at the beginning of the training pay a fee inoder to be register as a member of the workshop and the duration of the training is being negotiated which sometimes last for three to four years, three years and sometimes more. The apprentice in the process acquire skills of cognitive apprenticeship where they work side-by-side with the expert to acquire tacit knowledge and vocational skills. Tacit knowledge is therefore acquire through discovery learning, imitation as the apprentice observe, practice gain skills and competencies through experience. The novice in the process of learning gain vocational skills and occupational skills where he or she uses the tools of the workshop to practice. During the training given in cognitive apprenticeship, the master is expected to provide some basic moral upbringing to the child too. Masters have these cognitive skills but might not have the strategies to transmit as the researcher thinks coaching, scaffolding and executive functioning could be some strategies to use when transmitting cognitive skills to the apprentice for productive learning to take place.

Statement of the problem

The problematique between cognitive apprenticeship and productive learning in Buea Municipality in mechanic work can be traced from the end productive that is productive learning where inadequate skills, competencies, values and aptitudes are being provided by the expert to the novice. The kind of apprenticeship mostly practiced is traditional; apprenticeship is mechanical focusing on transmission of skills from the expert to the novice with no opportunities to develop reflective, creative and thinking skills. Therefore, the application of cognitive skills has a great role to play for productive learning. In the absence of addressing these

cognitive skills during training productive learning is greatly hampered. Since the trainers themselves lack skill in coaching, scaffolding and employing executive functioning, they will not be able to facilitate the development of apprentices' productive learning, skills through ensuring that deep learning is taking place. The researcher saw students from non-formal sector (OIC) Buea engaged in some mechanic garages doing their practical and internship, and the researcher deemed as problematique and carried out this research in mechanic garages in Buea.

Objective of the study

Main variables: Cognitive apprenticeship and Productive learning

General objective

- To determine the extent to which cognitive apprenticeship impact productive learning among out-of-school emerging adults engaged in mechanic work in Buea Municipality

Specific objectives of the study

Specifically, this study is intended:

- To determine the extent to which coaching impact productive learning among out-of-school emerging adults engaged in mechanic work in Buea Municipality

LITERATURE REVIEW

Discussion of concepts

The Concept of Cognitive Apprenticeship

According to Brown, Collins & Duguid (1989) cognitive apprenticeship is seen as an instructional tool that is aimed at helping novices acquire cognitive skills that are with cognitive processes, interpretation and decision making. The concept of cognitive apprenticeship is rooted in constructivist perspective. Constructivism explain that knowledge is constructed by the learner based on their experience. Cognitive apprenticeship is seen as an instructional tool that is aimed at helping novice acquire cognitive skills that are concerned with cognitive processes, interpretation and decision making. The cognitive skills derived from cognitive apprenticeship are paying attention in order to stay focus, logical and reflective reasoning via ideas and problem solving, convergent thinking, divergent thinking, critical thinking and processing speed that enable one to perform task quickly. The development of cognitive skills demands a sophisticated learning process and runs inside a human mind (Patel, Kinshuk & Russell, 2002). According to Collins et al., (1989) asserted that cognitive apprenticeship, novices can observe how experts deal with problems in an authentic context and they learn to solve the same or similar problems by "learning through guided-experience" in authentic activities. In fact, experts should put their thoughts and reasons in to words while explaining and demonstrating certain actions such as describing what they are thinking and doing, why they are doing what they are doing, and verbalizing their self-correction processes (Seitz, 1999). In fact, this thinking aloud allows novices to build a conceptual model and acquire an integrated set of cognitive and metacognitive skills through processes of observation (Collins 1999; Collins et al., 1989). Bandura (1997) asserted that learners should pay attention, retain informant by remembering, motor reproduce through practice and be motivated by performing the task and encouraging them through reinforcement in task accomplishment via self-efficacy. Cognitive apprenticeship therefore is a vicarious learning that is learning by observation of others behaviour. Cognitive apprenticeship eventually gives learners the opportunity to explore open-ended topics and develop competency by choosing their own paths toward problem solving. Opportunities for exploration encourage learners to pose their own problem and frame their own questions (Collins et., 1991).

Collins et al., (1989) define cognitive apprenticeship as learning through guided experience on cognitive and metacognitive skills rather than physical skills and processes. One cannot engage on cognitive apprenticeship alone, but rather it is dependent on expert demonstration (modelling) and guidance (coaching) in the initial phases of learning. Learners are challenged with tasks slightly more difficult than they can accomplish on their own and must rely on assistance from and collaboration with others and with time move from a position of observation to one of active practice (Collins et al., 1989). Notwithstanding, core to cognitive apprenticeship as a method of learning are the concepts of situatedness and legitimate peripheral participation both described by Lave & Wenger (1991). For the following methods support the goals of cognitive apprenticeship or features proposed in the context of cognitive apprenticeship. That is modelling, coaching, scaffolding and fading, articulation, reflection and exploration. Modelling in cognitive apprenticeship means showing how a process unfolds and given reasons why it happens that way. The goal of this stage is to build mental models of experts, cognitive processes so that learners can eventually work on their own (Krill, Kim, & Galloway, 20001). Moreover, by seeing both processes, learner can develop the knowledge about what and when they should use the knowledge to solve a variety of problems (Seitz, 1999; Wilson, Jonassen & Cole, 1993; Wilson & Cole, 1991). Modelling just not occur at the beginning of the study. As the learner experiment and create, the teacher might take a moment to model a more sophisticated technique (Darling-Hammon, Austin, Cheung, Lit & Martin, 2006).

The concept of coaching

Coaching within cognitive apprenticeship consist of assistant consists of assistance delivered either prior to, during or after portions of a learner performance (Darling-Hammond, Austin, Cheug, Lit, Martin, 2006; Gibbons, 1996). The master coachers the apprentice through a wide range of activities choosing task, providing hints, and scaffolding, evaluating the activities of apprentices and diagnoses the kind of problems they are having, challenging them and offering encouragement, giving feedbacks, structuring the ways to do things, working on a particular weakness. In fact, coaching is the process of overseeing the learning (Collins et al., 1991) one key to effective coaching is to not interfere too much thereby, all learners should detect and use their own errors (Seitz, 1999; Wilson &Cole, 1991)

Furthermore, coaching therefore involves observing novices while they carry out a task and offering hints, scaffolding, feedback, modelling, reminders and new tasks aimed at bringing their performance closer to expert performance. Coaching therefore may serve to direct novices attention to a previously unnoticed aspect of the task or to remind the novices of some aspects of the task that is known but has been temporarily overlooked. Coaching is geared on the enactment and integration of skills in the service of a well

understood goal thoroughly highly situated feedback and suggestions is the content of the coaching, interaction is related to specific events or problems that arise as the novice attempts to accomplish the goal. Scaffolding (organizational strategies and other support materials) help support the novice own effort.

Furthermore, coaching and corrections are provided as learners work on increasingly complex problems and then the support is withdrawn as the learner develop competency. Through modelling, novices learn through thinking aloud where instructions describe what they are thinking and doing. Like traditional apprenticeship, the apprentice learns a trade such as tailoring or wood working by working under the expert. Coaching provides assistance at the critical level, the skill level beyond what the apprentice could accomplish by him or herself which Vygotsky referred to this as the zone of proximal development and believed that most rapid development where corrective feedback, and reminders given during coaching. The concept of coaching informs Vygotsky sociocultural theory of learning as learners need mediation in order to accomplish a task and it also informs Apprenticeship theory of Babara Rogoff as learners need to observe expert perform a task and they later on perform on their own. The concept of coaching also informs the communities of practice and situated learning by Lave and Wenger as learners learning takes place in authentic real life environment where learners interactive in order to accomplish a task.

The concept of Emerging adulthood

Emerging adulthood is a proposed as a new conception of development for the period from the late teens through the twenties, with a focus on ages 18 to 25 (Arnett, 1998). Emerging adulthood is meant to describe a new stage for the period between adolescence and adulthood. Importantly, it is not considered a universal life stag, but rather one that have emerged in certain industrialized societies due to social and economic changes that have led to delays in marriage, parenthood, and assumption of other adult roles (Arnette, 2001, 2011). Emerging adulthood has five defining features according to Arnett (2004); identity exploration, in which young people are searching to find meaning in work, relationships and ideologies, age of instability; which refers to individual tendencies to change residence, job, relationships more frequently than at other times of life; age of possibilities; captures the optimistic spirit of emerging adults referring to many options that emerging adults see before them, self-focus; refers to emerging adults relative freedom from obligation to parents, spouses, and children, allowing them to pay greater attention to their own lives, and age of feeling in between; is indicative of the subjective experience of emerging adults, who acknowledge feeling not quite like adolescents anymore, but not fully adults yet. Arnett, 2004 sees emerging adulthood as a time a time of exploration and opportunity. The cognitive characteristics of emerging adults in the context of this study is their thought is postformal, more practical, flexible and dialectical characterized by problem solving, as they look at the cons and pros in problem solving. They have a sense of broad possibilities for the future by reasoning dialectically.

According to Lo-oh (2009) the implication in the lifecourse is evidenced in how young people conceive and define adult status today. According to him, in the African sub region in general and Cameroon in particular, the transition to adulthood is an arduous task characterized by several challenges (Lo-oh, 2009). Notwithstanding, social and economic inequalities in the African continent continue to mark the challenges of Africa's youth life courses. Youths in urban areas are beginning to experience problems with over nutrition, some rural youths still face nutritional deprivation (Nsamenang, 2007). (Lo-oh, 2009) asserted that unemployment and crime rates are dramatically higher among rural youth and young adult counterparts, thus enjoy significant advantages in a labour market that increasingly reward credentials and not basic skills. According to him, the outcome is that youngest people's vision for adulthood in the sub region is ill-fated by such difficulties with corresponding adverse effects on young people's definitions of adult status as well as their experiences of emerging adulthood (Lo-oh, 2009). According to Lo-oh (2009) transitioning youth do not complete the transition to adulthood these days until even in their early

The concept of productive learning

Productive learning involves activity that people engage in order to do something. Productive learning involve knowledge derived from activity of this process. It therefore refers to learning from experience of productive activity and it involves aspects of vocational orientation and vocational training. Productive learning goes with making object for everyday use with "head and hand and heart". Hence, cognitive apprenticeship lays emphasis on problem solving and which focus on guiding cognition, and metacognitive learning which brings about contextual learning. With cognitive apprenticeship knowledge is anchored and indexed by the context in which the learning activity occurs (Brown et. al., 1989). Therefore, knowledge construction is embedded in activity (Jonassen, 1999). Therefore, learning is based on externalizing thought processes in diagnosing problems via reasoning.

30s. Emerging adults passed through a milestone of enduring possibilities that are normative in adult (Arnett, 2000; Barry & Nelson, 2005). They are therefore exposed to conflicting, uncertain and unstable definitions of the future of their adulthood. Negotiating the trajectory to adulthood in Cameroon and Africa is defined with a lot of setbacks such as unemployment, health care, malnutrition and social services are unevenly distributed (Lo-oh, 2009).

The concept of mechanic work

Mechanic work is a trade craftsmanship. Mechanic work involves application of specific knowledge in the design, selection, construction, operation and maintenance of automobiles. Mechanic work is a trade. Mechanic work is geared to test, diagnose, service and completely maintain fault relating to the conventional automobile assembly like vehicles of different brands. Mechanic work enable workplace skills and create higher order thinking skills which are needed in order to increase the learners' flexibility and job mobility which makes them adaptable to the present and envisaged changes (Hallak & Poison, 2000).

Furthermore, mechanic work is based on constructivist learning theories of which is the cognitive apprenticeship instructional method. The lecture method is being used predominantly in teaching mechanic or automobile technology and it is based on behavioural learning theories (Boyle et al., 2003). Emphasis is placed on transmission from

the expert to the passive novice. Therefore, the increase effect of globalization and the rapid technological changes in the workplace have been acknowledge in the recommendation by UNESCO (2002) which states that technical education should be geared towards lifelong learning. This entails that workplace skills such as creativity, problem solving, collaborative skills should be encouraged. Mechanic work comprised of the following components; calibrating brakes, car engine, screws in tightening parts, electrical system in vehicles, combustion and diesel mot.

Theoretical concerns

Cognitive development in social context: Apprenticeship in thinking by Babara Rogoff (1990)

The theory of apprenticeship in thinking relates to sociocultural theory that foregrounds the role of the social environment in learning. It acknowledges that individuals appropriately share understandings differently (Cobb, 1994). An individual's appropriation of a shared understanding reflects that person understands which is influenced by various individual factors including prior experiences as well as cultural differences. With the guided help of an expert or more competent peer, the interactions between the expert and novice becomes an interpersonal interactive process, that leads the change in the intrapersonal process of the individual for development (Vygotsky, 1978). In order to make the interaction effective for learning, it is important that the members keep the shared understanding of the task and goals (Rogoff, 1990) and engage in the activity collaboratively. The active engagement and collaboration for the shared activity is closely related to the participants' socio-cultural knowledge as well as their interpretations of perceptions of their aims and objectives,

Furthermore, providing strategies on the other hand is goal oriented act of directing the novice towards skills or tools that will help him or her master a challenge. This strategy can be associated with the notion of guided participation (Rogoff, 1990) which includes personal actions where by the expert and learner go side by side in the cultural organized activity. The key to the expert role here is being responsive to the novice perspective, rather than directing it. As learning scientists trained in the sociocultural tradition, we understand learning as a fundamentally cultural, social and historical phenomenon (Scrbner & Cole, 1973; Vygotsky, 1934). Learning therefore is shifting participation in the everyday social practices of one's community (Rogoff, 1990; Lave & Wenger, 1991). Therefore, this is a kind of "connected learning", that is learning that spans home, school, after school in which individuals' pursuits interests with the support of others in ways that support career development (Penuel, Digiacomo, Vanhorne, & Kirshner, 2016).

Metacognitive theory by John Flavell (1978)

Research activity in metacognition began with John Flavell who is considered to be the father of the field. Metacognition is a concept that has been refer to a variety of epistemological processes. Metacognition essentially means cognition about cognition; that thoughts about thoughts, knowledge about knowledge. So, if metacognition involves perceiving remembering and so forth, then metacognition involves thinking about one's own perceiving, understanding, remembering. These various cognitions about cognition can be labelled "metacognition", "meta comprehension" and "meta memory" with metacognition remaining the superordinate term. Flavell (1978) referred to metacognition a knowledge that takes as it objects or regulates any aspects of any cognitive endeavours. Metacognition is defined in simplest terms as thinking about your own thinking. The root "meta" means "beyond", so the term refers to "beyond thinking". Specifically, this means it encompasses the processes of planning, tracking and assessing your own understanding or performance. Flavell identified what he believed to be two elements of metacognition and regulation of cognition (Flavell, 1985). He brought forth different types of metacognition knowledge. Firstly, declarative knowledge "personal knowledge or understanding one's own capabilities and procedural knowledge, task knowledge including content (what one need to know) on the other hand task knowledge is related to how difficult and individual perceives the task to be as to their self-confidence; while strategy knowledge is one's ability to use strategies to the new situation. This is related to the age or developmental age of the individual. Metacognition regulation is used to describe how individuals monitor and assess their knowledge. This includes knowing how and when to use certain skills, and help individuals to control their learning. For example, learners reflecting their learning on the tasks assigned to do efficiently. Metacognition experiences becomes very important in thinking about thinking. Metacognitive experiences are the experiences an individual has through knowledge. In metacognition, metamemory becomes relevant which is knowledge of what memory is, how it works and how to remember things. These skills develop over time and improves richly with instruction. The key factor in metacognition is motivation. Motivation is essential in essential for metacognition. Learners therefore can struggle through self-reflection, and self-evaluation skills are essential in order to accomplish a task (Flavell, 1985).

In like manner, critical thinking is a very important process in metacognitive. Critical thinking relates to the skills; analyzing argument (Ennis, 1985), making inferences using inductive and deductive reasoning (Ennis, 1985; Willingham, 2007; Paul, 1992; Facione; 1990), judging or evaluating (Case, 2005, Ennis, 1985; Facione, 1990; Lipman, 1988; Tindal & Nolel, 1995) and making decision or problem solving. (Ennis, 1985; Halpern, 1998) asserts that critical thinking entails skills or abilities and dispositions. Theses dispositions which can be as attitude or habits of the mind, include open or fair mindedness, inquisitiveness, flexibility, a propensity to seek reason, a desire to be well informed respect for or willingness to entertain diverse viewpoints (Bailin et al., 1999; Ennis 1985; Facione, 1990; Halpern, 1988, Paul, 1992). Both general and domain specific aspects of critical thinking suggests that instruction should represent a fusion of preparation in general and critical principles as well as practice in applying critical thinking skills within the context at specific domain (Ennis 1989; Facione, 1990; Paul, 1992).

Vygotsky Socio-Cultural theory (1896-1934)

Vygotsky believed that individual development could not be understood without reference to the social and cultural context within which such development is embedded. He states that using activity mediators, the human being is able to modify the environment and this is her way of interacting with nature. Hence, Zone of Proximal Development is

actually the gap between actual competence level (what problem level a learner is able to independently solve), and the potential development level (what problem level could she solve with guidance from a tutor). It supports a representation of intellectual development based on continuity. It states that learning can force cognitive development. It states the role of the expert as a necessary mediator of novices' cognitive development. Therefore, the Zone of Proximal Development is based the mental functions that have not yet matured but are being in the process of maturation. It supports a representation of intellectual development based on continuity. It states that learning can force cognitive development, and with scaffolding, cognitive development in the zones of proximal development stresses the role of a social partner of the novice (An expert or a more skilled peer). Also, with scaffolding, the instructor becomes a supportive tool for the student in the zone of proximal development. The characteristics of an ideal teacher are those in which scaffolding provides support, it functions as a tool, it allows to accomplish a task otherwise impossible. In Vygotsky's view, learning is an interactive interpersonal activity. The psychological mechanism is to create (external) activities that will be later internalized by novice.

Vygotsky (1978) believed that two levels of mental function exists. The elementary and higher mental functions. The first are functions that individuals are born with (that is, no learning required for their use), these functions require no thought and are natural occurring. Conversely, higher mental functions include the creation and use of self-generated stimulation such as memory, attention, thinking and language. The transition from elementary to higher mental functions is made through the use of tools and symbols. Culture then dictates what is valuable to learn and how it is learn. Society then is the driven force behind cognitive development. Cognitive development proceeds in order to prepare a person to interact with society in a meaningful way. Therefore, cognitive development is the internalization of social functions and the conversion of social functions in to mental functions. The concept in Vygotsky (1978) theory that each person has an individual range of potential for learning called zone of proximal development. The zone indicates that at any point in development, there are three levels of ability that are guidance or help, that which a person cannot do even if helped, that which a person can do without guidance or help, that which a person can do with help. The zone itself is the distance between the actual developmental level as determined by independent, problem solving and the level of potential as determined through problem solving under adult guidance or in collaboration with more capable peers.

Transformative Learning theory by Jack Mezirow (1978)

Transformative learning reflects a particular vision of adult learning and a conceptual framework for understanding how adults learn. The meaning of what one learns rest with the accuracy with which one internalizes and represents accuracy and the knowledge within one's own cognitive schemes. Paula Freire (1979) articulated transformative learning to refer to as a consciousness raising. Critical consciousness refers to a process in which learners develop the ability to analyze, pose questions and take action on the social, political, cultural and economic context that influence and shape their lives Paula Freire (1979). Transformative learning is emancipatory liberating at both a personal and social level, by constructing for ourselves the meaning of the world.

According to Mezirow (1991) transformative learning is the process of making meaning from our experiences through reflection, critical reflection and critical self-reflection. Meaning according to Mezirow means making sense of the day to dayness of our experiences. He eventually name this process perspective transformation to reflect change within the core and central meaning structures. Perspectives are made up of sets of beliefs, values and assumptions that we have acquired through our life experiences. These perspectives serve a lens through which we come to perceive and understand ourselves and the world we inhabit. While these perspectives organize and make sense of a great deal of information within our internal and external environment. Through critical reflection, however we come to identify, assess, and possibly reformulate assumptions on which our perspectives are constructed (Mezirow, 1991). Like Freire, Mezirow views knowledge as something that is constructed by the individual in relation with others. Although imagination and creativity play a key role in transformative learning (Mezirow, 1995). The core of learning process itself is mediated largely through a process of reflecting rationally and critically on one's assumptions and beliefs. For Merizow, the outcome of transformative learning reflects individuals who are more inclusive in their perception of the world, able to differentiate increasingly its various aspects, open to other view points and able to integrate their experiences in to meaningful and holistic relationships (Mezirow, 1991).

METHODOLOGY

Research design

A quasi experimental was chosen for this study to identify an intervention effect using an experimental group and control group to ascertain treatment effects on experimental group. The procedures employed tests causal effect (XY) and test causal hypothesis. Starting by ensuring through a pretest that the two groups are comparable and with a posttest repeating the pretest including researcher constructed test to ensure change in design.

At the initial stage, the researcher observed the trainers' practices in training the novices. This was done in sessions using an observation checklist to identify the strategies employed and the weaknesses. The outcomes guided the preparation of lesson notesfor the intervention which the researcher used to train the expert on psycho-pedgogical knowledge on coaching, scaffolding, executive functioning and productive learning and after some degree of satisfaction, the trainers were then engaged in training the apprentices on technical skills while the researcher observed the trainers training.

The experiential learning method was used as the teaching activity in the lesson. A pretest instrument was used to test the previous knowledge of learners followed by an intervention conducted through lesson notes on mechanic work. The experiential learning approach encourages hands-on teaching as an instructional strategy for training and developing vocational skills in the informal sector. Strategies employed include: explaining the use of concrete experiences; that is feeling and doing, active experimentation; planning and trying out what have been learned, reflective observation; watching, reviewing and

reflecting on experience and abstract experimentation; modification of existing abstract ideas and developing new concepts. All these were based on the main variable cognitive apprenticeship and specific objectives of the study on the following concepts, coaching, scaffolding and executive functioning and productive learning. And finally, posttest instruments were conducted.

The researcher used a triangulation method, where the researcher used both qualitative and quantitative research methods to collect data. Interview guide was used to collect qualitative data, and a structured questionnaire and observational checklists were used to collect quantitative data and it was structured measuring the objectives of the study, coaching, scaffolding and executive functioning, taking cognizance of the dependent variable productive learning with indices such as, aptitudes, abilities, knowledge, intelligence, feelings, skills and competencies necessary for craftsmanship in the informal sector like tailoring and mechanic work for both trainers and apprentices.

Population of the study

The population of this study was made up of out-of-school emerging adults between the ages 18 to 25 involve in vocational training in the informal sector particularly in mechanic work in Buea Municipality

The target population of this study comprised of out-of-school emerging adults in Buea Municipality engaged in craftsmanship in mechanic work. It involved out-of-school emerging adults between the ages 18 to 25 in Buea Municipality involved in mechanic work. While the accessible population was made up of twelve (6) out-of-school emerging adults in mechanic garages. That is six (6) apprentice were involve in the study in garage **one**, with three (3) in the experimental group and three (3) in the control group in the same garage. There was a total of 2 trainers. One in the experimental group and one in the control group

Sample and sampling technique

The study was carried in Buea Municipality in the informal sector among out-of-school emerging adults in mechanic work where the sample of the study was drawn. The sample of this study was derived from the accessible population of the study. A sample of 6 apprentice and 2 trainers, one in the control group and one in the experimental group. The study took place at "The young shall grow garage" located at First Trust Great Soppo Buea Cameroon below OIC Buea with a total of 6 apprentice in this garage. This garage had three (3) apprentice engaged in the experimental group and three (3) in the control group. This sample is justified by Goldstein & Pollock (1989) who state that in obtaining best results in any skills training programme, a group of three (3) to six (6) learners is appropriate. Accordingly, small groups enable novices to socially interact and share ideas and give feedback.

The sampling technique used in this study was the purposive sampling technique. The purposed of using the purposive sampling technique was to directly meet with the population of interest. The population of interest consists of out-of-school emerging adults between the age range 18 to 25. Hence, the purposive sampling was to select the population and participants of the study. In fact, the purposive sampling is a type in which the researcher uses his or her judgment to select a sample he or she believes is based on prior information that will provide the information the researcher needs. The researcher purposely administers instructional to those emerging adults engaged in mechanic work and tailoring in Buea Municipality. Furthermore, the purposive sampling technique focused on sampling techniques where the units that were investigated were based on the judgment of the researcher. The purposive sampling technique was used by the researcher for convenient purposes.

Table: Sample Size of the study

Experimental Group		Control Group	
Mechanic Work in Garage One for apprentice	3	Mechanic Work in Garage One for apprentice	3
Trainers engaged in Garage One	1		1
Total	6		6

The sample of this study comprised of 6 apprentice in the garage that is 3 in the experimental group and 3 in the control group. A total of 2 trainers, one in the control group and one in the experimental group

Instrument for data collection

The following methods were used to gather information from the correspondence. A questionnaire of 5 items per objective was conducted, an observational checklist and an interview guide was also designed that had statements from the following measures, coaching, productive learning, and productive learning measured the following; aptitude, mastery experience, attitude, discipline, knowledge, skills and competency development. A lesson note was prepared for mechanic work for the intervention with the used of the experiential learning as a teaching method. The intervention teaching lesson was made up of the following measures coaching and productive learning.

Reliability analysis

Table: Reliability analysis for the observation of apprentices in mechanic workshop

Test component	Cronbach's Alpha	N_{cases}	N_{items}
Coaching	0.633	6	5
Productive learning	0.618	6	5
IVM	0.755	6	20

As for the observation of apprentice in a mechanic workshop 1, the internal consistency assumption was not violated with Cronbach Alpha reliability coefficients ranging from 0.509 to 0.755, all up to the expected threshold of 0.5 or above.

Methods of data processing and analysis

Two mechanic workshops were involved in this quasi-experimental study. Data was analyzed for the two workshops separately, then for the two workshops combined.

Data Entry and Clean up

Quantitative data was entered using EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) and analyzed using the Statistical Package for Social Sciences (SPSS) Standard version, Release 21.0 (IBM Inc. 2012). Data cleanup (content cleanup and exploratory statistics): Exploratory statistics is an integrated part of data cleanup. Variables

were explored to identify questionable entries, inconsistency in responses and outliers and their validity discussed to make the necessary corrections (Nana, 2015). During this stage, the fate of missing data was defined. Some were set as missing and some recoded depending on the statistical requirements. Invalid codes prospectively were not supposed to exist as entries were initially checked in EpiData using suitable algorithms or machine language

Exploratory Statistics and Data Validation

The pre-designed EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) database which had an in-built consistency and validation checks helped in minimizing entry errors during data entry. Exploratory statistics continued with further consistency, data range and validation checks in SPSS version 21.0 (IBM Inc., 2012). The verification of questionable entries was equally facilitated by the fact that all copies of the data collection instrument were given codes and which codes were also entered into the data base and could help refer the instrument for eventual cross-checking. Other validation test included Missing Values Analysis and Reliability analysis, and a sample flow chart and sample flow table was developed at the end of data validation process.

Test of hypotheses

Cohen's *d* was used to compare assert significant difference. In fact, if we followed the steps to estimate power sampling, we then realize that it is possible to estimate a parameter when others are known. If this is the case, then, we can estimate a theoretical effect size at a given power when the sample size is known as well as alpha. By comparing this (Theoretical effect size) with the real one (Effect Size from the real experiment or study), we expect the Effect Size from the real experiment to be less than the Theoretical effect size for us to assert that the difference observed is really significant. In fact, there is type I error if one rejects the null hypothesis when it is true and there is type II error when one accepts the null hypothesis when it is false.

FINDINGS

Observations

Coaching

Mechanic workshop

Master

Table: Characterization of coaching by master in mechanic workshop based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
The expert do have task skill in the repair of the tires of the car when provided hints by the expert	0	1	0	1	1	0	0	1
Expert observe participant gain self-mastery skills on how to screw the nodes of the car when provided assistance	0	1	0	1	1	0	0	1
Expert ensures that novices overcome blocks of finding faults in a car when provided reminders	1	0	0	1	1	0	1	0
Expert provide directives when there is a breakdown in a car for participant to solve the problem	1	0	1	0	1	0	1	0
Expert do multi task with novices in locating electrical faults in a car by demonstrating	1	0	1	0	1	0	1	0
MRS	60% (3)	40.0% (2)	40.0% (2)	60.0% (3)	100% (5)	0.0% (0)	60.0% (3)	40.0% (2)

A proprotion of 40.0% of masters in mechanic had good coaching at pretest in the experimental group and this proprotion rose to 100% at posttest following the intervention. In the control group, this proprotion was 40% at pretest and almost stagnated at 60% at posttest.

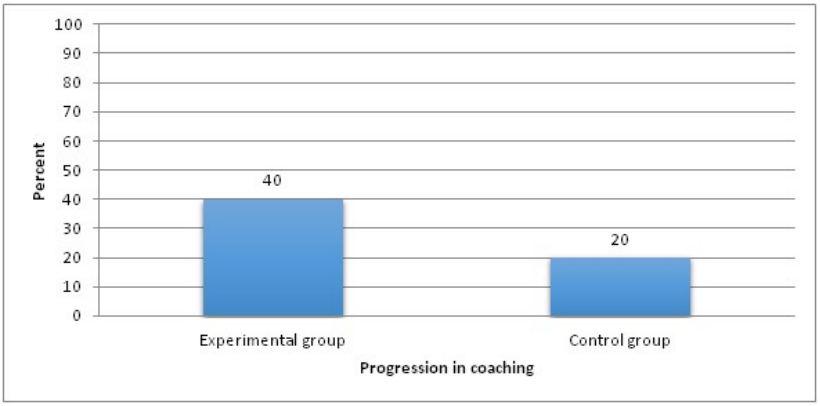

Figure: Progression in coaching for master in mechanic's workshop

As for masters in mechanic workshop, in the experimental group, there was a progression rate of 40% as against 20% in the control group.

Apprentice

Table: Characterization of response to coaching by apprentices in mechanic workshop based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Participant do have task skill in the repair of the tires of the car when provided hints by the expert	33.3% (1)	66.7% (2)	66.7% (2)	33.3% (1)	66.7% (2)	33.3% (1)	66.7% (2)	33.3% (1)
Participant self-master how to screw the nodes of the car when provided assistance	33.3% (1)	66.7% (2)	33.3% (1)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
Participant overcome blocks of finding faults in a car when provided reminders	66.7% (2)	33.3% (1)	0.0% (0)	100% (3)	66.7% (2)	33.3% (1)	33.3% (1)	66.7% (2)
Participant adapt in solving certain breakdown in cars like the brakes after gained experience	33.3% (1)	66.7% (2)	66.7% (2)	33.3% (1)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
Participant multi task in locating electrical faults in a car when provided directives	66.7% (2)	33.3% (1)	0.0% (0)	100% (3)	66.7% (2)	33.3% (1)	33.3% (1)	66.7% (2)
MRS	46.7% (7)	53.3% (8)	33.3% (5)	66.7% (10)	80.0% (12)	20.% (3)	40.0% (6)	60.0% (9)

A proprotion of 46.7% of apprentices in mechanic garage had good response to coaching at pretest in the experimental group and this proprotion rose to 80.0% at posttest following the intervention. In the control group, this proprotion was 33.3% at pretest and rose slightly at 40.0% at posttest.

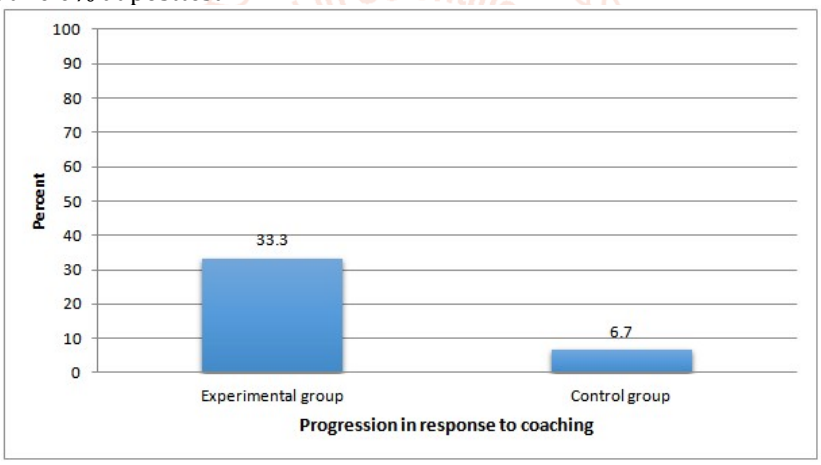

Figure: Progression in response to coaching for mechanic apprentices in workshop 1

As for apprentices, in the experimental group, there was a progression rate of 33.3% as against 6.7% in the control group.

Productive learning

Mechanic workshop

Master

Table: Characterization of productive learning instructions from master in mechanic workshop based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Expert bring in creative ideas to do fruitful work in mechanic work with novices	0	1	1	0	1	0	1	0
The expert gets in to hands on activities with novices where the level of performance perfect	1	1	0	1	1	0	1	0
Expert provides enough directives for novices to gain practical and analytical skills	0	0	1	1	1	0	0	1
Expert-novice experience leads to creative knowledge in problem solving	0	1	0	0	1	0	1	0
Expert and apprentice have competency in problem solving	1	0	1	0	1	0	0	1
MRS	40.0% (2)	60% (3)	60.0% (3)	40.0% (2)	100% (5)	0.0% (0)	60.0% (3)	40.0% (2)

A proprotion of 40.0% of masters in the mechanic garage had good output as productive learning at pretest in the experimental group and this proprotion rose to 100% at posttest following the intervention. In the control group, this proprotion was 60% at pretest and stagnated at 60% at posttest.

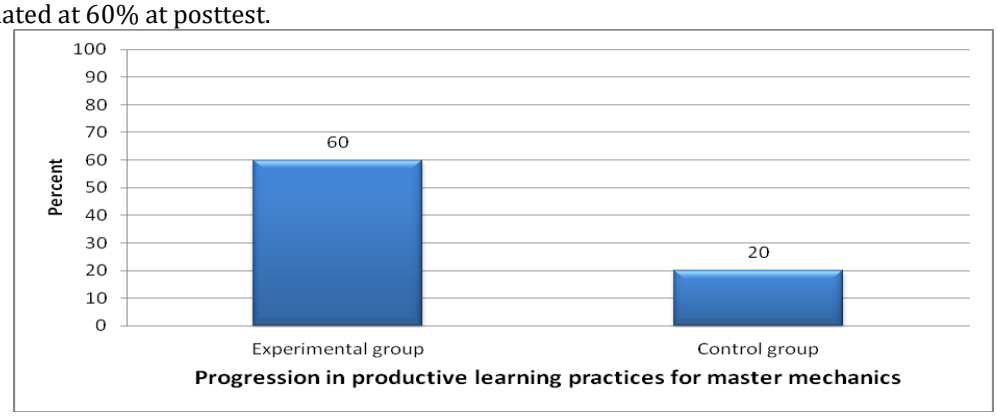

Figure: Progression in productive learning output for master mechanics in worksop 1

As for masters in mechanic workshop, in the experimental group, there was a progression rate of 60% as against 20% in the control group.

Apprentice

Table: Characterization of apprentices' responses to productive learning instructions in mechanic workshop based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Novices have creative ideas to detect a fault in a car	66.7% (2)	33.3% (1)	33.3% (1)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
Participant have abilities to identify and fix breakdowns in cars	33.3% (1)	66.7% (2)	0.0% (0)	66.7% (2)	33.3% (1)	66.7% (2)	66.7% (2)	33.3% (1)
Novices have knowledge to identify screws to use in a car to solve a problem	33.3% (1)	66.7% (2)	33.3% (1)	66.7% (2)	66.7% (2)	33.3% (1)	0.0 (0)	100% (3)
Expert-novice experience leads to competency in handily faults in cars	66.7% (2)	33.3% (1)	66.7% (2)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
Expert and apprentice performance in inquiry in problem solving is cordial	0.0% (0)	100% (3)	33.3% (1)	66.7% (2)	66.7% (2)	33.3% (1)	33.3% (1)	66.7% μ(2)
MRS	40.0% (6)	60.0% (9)	33.3% (5)	66.7% (10)	73.3% (11)	26.7% (4)	33.3% (5)	66.7% (10)

A proprotion of 40.0% of mechanic apprenctices had good response as productive learning at pretest in the experimental group and this proprotion rose 73.3% at posttest following the intervention.In the control group, this proprotion was 33.3% at pretest and stagnated at 33.3% at posttest.

Describing apprentices' perceptions

Coaching

Mechanic workshop

Table: Characterization of coaching in the experimental group for apprentices in mechanic workshop at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	Agree	Disagree
My patron provide me with hint for me to repair and fit the tyre of the car	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
My instructor provide me with directives to tighten nodes of the tyres during breakdowns	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)	0.0% (0)	100.0% (3)
My instructor provide me with reminders to locate faults of cars when they is a breakdown	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
The instructor directs me on how to test the brakes of the car while the expert observe when whether there is a fault	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
Feedback is often given by the to novices after they do electrical works in the car to improve on their competencies	0.0% (0)	0.0% (0)	66.7% (2)	33.3% (1)	0.0% (0)	100.0% (2)
MRS	20.0% (3)	6.6% (1)	60.0% (9)	13.3% (2)	26.7% (4)	73.3% (11)

A proprotion of 26.7% of apprentcies in the workshop perceived that they had good coaching at pretest in the experimental group.

Table: Characterization of coaching in the experimental group for apprentices in mechanic workshop at posttest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	Agree	Disagree
My patron provide me with hint for me to repair and fit the tyre of the car	0.0% (0)	100.0% (3)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My instructor provide me with directives to tighten nodes of the tyres during breakdowns	33.3% (1)	66.7% (2)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My instructor provide me with reminders to locate faults of cars when they is a breakdown	0.0% (0)	100.0% (3)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
The instructor directs me on how to test the brakes of the car while the expert observe when whether there is a fault	33.3% (1)	66.7% (2)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Feedback is often given by the to novices after they do electrical works in the car to improve on their competencies	33.3% (1)	66.7% (2)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
MRS	20.0% (3)	80.0% (12)	0.0% (0)	0.0% (0)	100.0% (15)	0.0% (0)

A proprotion of 80.0% of apprenctces in the workshop perceived that they had good coaching at posttest in the experimental group.This proprotion then rose to from 26.7% at pretest and rose to 80% thus indicating a progression of 73.3%.

Table: Characterization of coaching in the control group for apprentices in mechanic workshop at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron provide me with hint for me to repair and fit the tyre of the car	33.3% (1)	33.3% (1)	0.0% (0)	33.3% (1)	66.6% (2)	33.3% (1)
My instructor provide me with directives to tighten nodes of the tyres during breakdowns	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)	0.0% (0)	100.0% (3)
My instructor provide me with reminders to locate faults of cars when they is a breakdown	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
The instructor directs me on how to test the brakes of the car while the expert observe when whether there is a fault	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Feedback is often given by the to novices after they do electrical works in the car to improve on their competencies	0.0% (0)	0.0% (0)	66.7% (2)	33.3% (1)	0.0% (0)	100.0% (3)
MRS	33.3% (5)	13.3% (2)	40.0% (6)	13.3% (2)	46.6% (7)	53.3% (8)

A proprotion of 46.6% of apprenctces in the mechanic workshop perceived that they had good coaching at pretest in the control group.

Table: Characterization of coaching in the control group for apprentices in mechanic workshop at posttest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron provide me with hint for me to repair and fit the tyre of the car	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
My instructor provide me with directives to tighten nodes of the tyres during breakdowns	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)	0.0% (0)	100.0% (3)
My instructor provide me with reminders to locate faults of cars when they is a breakdown	33.3% (2)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (2)	66.7% (2)
The instructor directs me on how to test the brakes of the car while the expert observe when whether there is a fault	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
Feedback is often given by the to novices after they do electrical works in the car to improve on their competencies	0.0% (0)	0.0% (0)	66.7% (2)	33.3% (1)	0.0% (0)	100.0% (3)
MRS	26.7% (4)	6.6% (1)	60.0% (9)	13.3% (2)	33.3% (5)	73.3% (11)

A proprotion of 33.3% of apprenctces in the workshop perceived that they had good coaching at posttest in the control group.This proprotion then rose to from 46.6% at pretest and dropped to 33.3% thus indicating a regression of 13.3%.

Productive learning
Mechanic Workshop

Table: Characterization of productive learning in the experimental group for apprentices in mechanic workshop at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
Apprentice improvise ideas in order to solve a fault in a car	66.7% (2)	0.0% (0)	0.0% (0)	33.3% (1)	66.7% (2)	33.3% (1)
Apprentice have abilities to sort out the fault in a car with the support from friends	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
Apprentice have competency when they get inquiry to sort a faults in car	0.0% (0)	0.0% (0)	33.3% (1)	66.7% (2)	0.0% (0)	100.0% (3)
Apprentice have good analytical and practical skills in problem solving in a car	66.7% (2)	0.0% (0)	0.0% (0)	33.3% (1)	66.7% (2)	33.3% (1)
Apprentice control their feelings and keep doing their task until they solve problem in the car	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
MRS	40.0% (6)	0.0% (0)	26.7% (4)	33.3% (5)	40.0% (6)	60.0% (9)

A proprotion of 40.0% of apprenctces in the workshop perceived that they had good productive learning at pretest in the experimenyal group.

Table: Characterization of productive learning in the experimental group for apprentices in mechanic workshop at posttest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
Apprentice improvise ideas in order to solve a fault in a car	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice have abilities to sort out the fault in a car with the support from friends	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice have competent when they get inquiry to sort a faults in car	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice have good analytical and practical skills in problem solving in a car	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice control their feelings and keep doing their task until they solve problem in the car	33.3% (1)	33.3% (1)	33.3% (1)	0.0% (0)	66.6% (2)	33.3% (1)
MRS	66.7% (10)	26.6% (4)	6.6% (1)	0.0% (0)	93.3% (14)	6.6% (1)

A proprotion of 93.3% of apprenctces in the workshop perceived that they had good productive learning at posttest in the experimenyal group.This proportion was 40.0% as pretest thus implying a progression of 53.3%.

Table: Characterization of productive learning in the control group for apprentices in mechanic workshop at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
Apprentice improvise ideas in order to solve a fault in a car	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice have abilities to sort out the fault in a car with the support from friends	0.0% (0)	0.0% (0)	33.3% (1)	66.7% (2)	0.0% (0)	100.0% (3)
Apprentice have competent when they get inquiry to sort a faults in car	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice have good analytical and practical skills in problem solving in a car	33.3% (1)	0.0 % (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
Apprentice control their feelings and keep doing their task until they solve problem in the car	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
MRS	53.3% (8)	6.6% (1)	20.0% (3)	20.0% (3)	60.0% (9)	40.0% (6)

A proprotion of 60.0% of apprenctces in workshop perceived that they had good productive learning at pretest in the control group.

Table: Characterization of productive learning in the control group for apprentices in mechanic workshop at posttest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
Apprentice improvise ideas in order to solve a fault in a car	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
Apprentice have abilities to sort out the fault in a car with the support from friends	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice have competent when they get inquiry to sort a faults in car	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
Apprentice have good analytical and practical skills in problem solving in a car	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Apprentice control their feelings and keep doing their task until they solve problem in the car	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
MRS	60.0% (9)	0.0% (0)	26.6% (4)	13.3% (2)	60.0% (9)	40.0% (6)

A proprotion of 60.0% of apprenctces in the workshop perceived that they had good productive learning at posttest in the control group. Therefore, there was no change from pretest to posttest.

Summary of finding

Table: Summary of findings

Research hypotheses	Statistical test used	Comments
Research hypothesis one: There is no significant relationship between coaching and productive learning among emerging adults engaged in tailoring and mechanic work in Buea Municipality.	(Cohen's *d*): If the theoretical effect size is smaller than the calculated one, we then reject the hypothesis that the means are not significantly different at 90% power and at 95% CL with cohort sample 3 and a total sample size 6 as it is the case in our study context.	As for the total score in coaching for mechanics in the experimental group, the mean at pretest was 8.7 and rose to 11.9 at posttest and this increase was significant (negative Cohen's d). In fact, the theoretical effect size is smaller than the calculated one, we then reject the hypothesis that the means are not different. This therefore implies that there was a significant progression from pre-test to post-test. Concerning the outcome variable which is productive learning, as for the total for mechanic in the experimental group, the mean at pretest was 9.7 and rose to 13.4 at posttest and this increase was significant (negative Cohen's d). This significant improvement in productive learning score was as the result of improvement in coaching because such improvement was not obtained in the control group where no significant improvement was realized in coaching from pretest to posttest. The hypothesis here stated is then accepted.

DISCUSSION

Coaching and productive learning among out-of-school emerging adults engaged in mechanic work

Notwithstanding, as regard mechanic work, there was a significant progression from pretest to post test in coaching. For the experimental group, mean at pretest rose from 8.7% to 11.9% at posttest which lead to a significant progression from pretest to post test. As for the total score in coaching for mechanics in the experimental group, the mean at pretest was 8.7 and rose to 11.9 at posttest and this increase was significant (negative Cohen's d). Concerning the outcome variable which is productive learning, as for the total for mechanic in the experimental group, the mean at pretest was 9.7 And rose to 13.4 at posttest and this increase was significant (negative Cohen's d). This significant improvement in productive learning score was as the result of improvement in coaching because such improvement was not obtained in the control group where no significant improvement was realized in coaching from pretest to posttest. This matches with (Darling-Hammond et al., 2006; Gibbons, 1996) who assert that coaching with cognitive apprenticeship consists of assistance delivered either prior to during or after portion of a learning performance. Therefore, the master coaches the apprentice through a wide range of activities, choosing tasks, providing hints, evaluating the activities of apprentices and diagnosing the kinds of problems they are having, challenging them and offering encouragement, giving feedback, structuring the ways to do things, working on particular weaknesses. Therefore, coaching is the process of overseeing the apprentice learning (Collins et al, 1991). Collin, Brown & Newman (1989) also asserted that coaching is assistance from masters to novice. As for total score.

Correspondingly, as regards masters in mechanic work, Majority of masters had good coaching at pretest in the experimental group but it rose to 100% at posttest following The intervention. While with the control group at pretest, the proportion was normal and little change at posttest. This is in line with (Collins et al, 1991) who concluded that One key to effective coaching is to not interfere too much thereby, allowing novices to detect and use their own error (Seitz, 1999; Wilson & Cole, 1991). Similarly, coaching involve an expert providing some type of assistance to a learner to facilitate attainment of a goal. However, coaching may be seen as a broader term than scaffolding to assist learners in their learning from start to finish (Brill, Kim & Galloway. 2001).

In addition, a proprotion of master in mechanic had good coaching at pretest in the experimental group and this proprotion rose to a greater ratio at posttest following the intervention. Furthermore, as far as coaching is concerned for mechanic in the experimental group the mean increased at posttest was significant and the hypothesis was retained. In the same way, Parslock & Wray (2000) pointed out that a coach is one who focuses on assisting learners to meet a specific goal while a coach is one who also provides the ongoing support. Coaching consists of providing apprentice with opportunities to attempt problems relevant to everyday life, observing them in practice and providing feedback on their performance in a timely manner and while they actively think about the problem solving strategies. In the control group, this proprotion was low at pretest and almost stagnated at posttest. Productive learning was therefore significant due to coaching at posttest. The progression was higher in the experimental group in both workshops, 53.3% in workshop 1 and 20.0% in workshop 2. Most apprentice have good analytical and practical skills in problem solving in a car and improvise ideas in order to solve a fault in a car. Likewise, Mezirow (1978) transformative theory pointed out that productive learning is based on the rationale of reflective and rational thinking as one gain experience in the process of learning, although imagination and creativity play a key role in transformative learning (Mezirow, 1995). The core of learning process itself is mediated largely through a process of reflecting rationally and critically on one's assumptions and beliefs. For Merizow, the outcome of transformative learning reflects individuals who are more inclusive in their perception of the world, able to differentiate increasingly its various aspects, open to other view points and able to integrate their experiences in to meaningful and holistic relationships (Mezirow, 1991).

In addition, as for master mechanics in workshop 1, in the experimental group, there was a progression rate of 40% as against 20% in the control group. As for master mechanics in workshop 1, in the experimental group, there was a progression rate of 40% as against 20% in the control group. There was similar progression in mechanic workshop two. This progression from pretest to posttest can be associated with the notion cognitive development in social context theory of apprenticeship in thinking, the notion of guided participation by (Rogoff, 1990) which includes personal actions where by the expert and learner go side by side in the cultural organized activity. In fact, guided participation refers to observation, as well as hand-on involvement in an activity and guided participation refers to observation, as well as hand-on involvement in an activity and appropriation therefore involve a process of transformation that is change resulting from a person's participation in an activity where novices transform their skills through active engagement in task (Rogoff, 1981). In order to make the interaction effective for learning, it is important that the members keep the shared understanding of the task and goals (Rogoff, 1990) and engage in the activity collaboratively. The active engagement and collaboration for the shared activity is closely related to the participants' socio-cultural knowledge as well as their interpretations of perceptions of their aims and objectives. In the same fashion, the key to the expert role here is being responsive to the novice perspective, rather than directing it. As learning scientists trained in the sociocultural tradition, we understand learning as a fundamentally cultural, social and historical phenomenon (Scrbner & Cole, 1973; Vygotsky, 1934). Learning therefore is shifting participation in the everyday social practices of one's community (Rogoff, 1990; Lave & Wenger, 1991). Therefore, this is a kind of "connected learning", that is learning that spans home, school, after school in which individuals' pursuits interests with the support of others in ways that support career development (Penuel, Digiacomo, Vanhorne, & Kirshner, 2016).

From observation, majority of apprentice were observed to have task skill in the repair of the tires of the car when provided hints by the expert at posttest in the experimental group. Most participants were observed to self-master how to screw the nodes of the car when provided assistance. A good percentage of apprentice were observed to overcome blocks of finding faults in a car when provided reminders at posttest in the experimental group. Most apprentice were observed to have adapt in solving certain breakdown in cars like the brakes after gained experience at posttest in the experimental group. Same in workshop two, there was a great increase as regards the above in terms in coaching at posttest in the experimental group and with a small change in the control group. A proprotion of 33.3% of mechanic in workshop 2 apprenctcies had good response to coaching at pretest in the experimental group and this proprotion rose to 73.3% at posttest following the intervention. This is in line with (Darling-Hammond, Austin, Cheug, Lit, Martin, 2006; Gibbons, 1996). who pinpointed that master coaches the apprentice through a wide range of activities choosing task, providing hints, and scaffolding, evaluating the activities of apprentices and diagnoses the kind of problems they are having, challenging them and offering encouragement, giving feedbacks, structuring the ways to do things, working on a particular weakness. In fact, coaching is the process of overseeing the learning (Collins et al., 1991). In like manner (Seitz, 1999; Wilson &Cole, 1991) opine that one key to effective coaching is to not interfere too much thereby, all learners should detect and use their own errors. Likewise, Coaching is geared on the enactment and integration of skills in the service of a well understood goal thoroughly highly situated feedback and suggestions is the content of the coaching, interaction is related to specific events or problems that arise as the novice attempts to accomplish the goal

Comparatively, there was no significant different between the two workshops as far as coaching was concerned for both masters and apprentices (P>0.05). This matches with apprenticeship theory of Rogoff, 1990) in thinking in social context, whereby providing strategies on the other hand is

goal oriented act of directing the novice towards skills or tools that will help him or her master a challenge. This strategy can be associated with the notion of guided participation (Rogoff, 1990) which includes personal actions where by the expert and learner go side by side in the cultural organized activity. The key to the expert role here is being responsive to the novice perspective, rather than directing it. As learning scientists trained in the sociocultural tradition, we understand learning as a fundamentally cultural, social and historical phenomenon (Scrbner & Cole, 1973; Vygotsky, 1934).

CONCLUSION

To conclude, the study attempted to investigate on the concept of cognitive apprenticeship as a determinant of productive learning among out-of-school emerging adults (18-25) engaged in craftsmanship. From the findings, it can be concluded that coaching has a positive relationship with productive learning, as trainers efficiently coach the apprentice, they gain practical skills and become more efficient and competent in the repair of cars and maintenance of cars in mechanic garages. Coaching therefore enable apprentice to build trust and gain skills, that enable them become competent in the maintenance and repair of cars. Therefore, when hints, cues, directives, demonstration, reminders, and feedback are constantly provided to apprentices they gain aptitudes, knowledge, abilities and skills that enable them to be competent and become productive in task accomplishment.

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